

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) An optical system comprising a diffraction element formed of a substantially rigid first material having a first refractive index, the diffraction element having:

a) a first plurality of grooves at a first interface of the diffraction element with a second material having a second refractive index; and

b) a second, differently proportioned, plurality of grooves at a second, different, interface of the diffraction element with a third material having a third refractive index,

wherein the first and second pluralities of grooves are aligned with respect to each other such that a combined diffractive effect is achieved,

wherein the third material is a liquid, and wherein widths of

~~the first plurality of grooves vary from an edge to a center of the diffraction element~~ a first width of a first groove at an edge of the diffraction element is different from a second width of a second groove adjacent to the first groove.

2. (Previously Presented) The optical system according to claim 1, wherein said first plurality and said second plurality of grooves are blazed and arranged to select a desired diffraction order of a given input radiation.

3. (Previously Presented) The optical system according to claim 1, wherein said first plurality of grooves have a first depth (d1), said second plurality of grooves have a second, different depth (d2), and wherein said first and second depths are different to each other.

4. (Currently Amended) An optical system comprising a diffraction element (2; 102; 202; 302) formed of a substantially rigid first material having a first refractive index, the diffraction element having:

- a) a first plurality of grooves (4; 104; 226) at a first interface of the diffraction element with a second material (8; 108; 208) having a second refractive index; and
- b) a second, differently proportioned, plurality of grooves (6; 106; 228) at a second, different, interface of the diffraction element with a third material (10; 110; 210) having a third refractive index,

wherein the first and second pluralities of grooves are aligned with respect to each other such that a combined diffractive effect is achieved,

wherein the third material is a liquid,

wherein said first plurality of grooves have a first depth (d1), said second plurality of grooves have a second, different depth (d2), and wherein said first and second depths are different to each other, and

wherein said grooves are arranged to fulfill the following relation:

$$-(n_1 - n_2)d_1 + (n_1 - n_3)d_2 = m\lambda_n$$

wherein, n1, n2 and n3 are the first, second and third

refractive indices respectively, d_1 and d_2 are the first and second depths respectively, m is a desired diffraction order and λ_n is a wavelength of the given input radiation.

5. (Previously Presented) The optical system according to claim 4, wherein the given radiation beam comprises a plurality of different wavelengths λ_n and the grooves are arranged such that a diffraction efficiency η is substantially maximized for each of said different wavelengths λ_n , the efficiency η for each of said different wavelengths λ_n of the given input different radiation beam being given using the following relation:

$$\eta = \left(\frac{\sin \left[\frac{\pi(-(n_1 - n_2)d_1 + (n_1 - n_3)d_2)}{m\lambda_n} - \pi \right]}{\frac{\pi(-(n_1 - n_2)d_1 + (n_1 - n_3)d_2)}{m\lambda_n} - \pi} \right)^2$$

6. (Previously Presented) The optical system according to claim 1, wherein said first plurality and said second plurality of grooves are arranged concentrically about an optical axis (OA).

7. (Previously Presented) The optical system according to claim 1, wherein widths of said coinciding pairs are substantially the same, said widths being in a direction perpendicular the optical axis.

8. (Previously Presented) The optical system according to claim 1, wherein the second material has a given optical dispersion and the third material has a different optical dispersion.

9. (Previously Presented) The optical system according to claim 1, wherein said second material is a fluid.

10. (Previously Presented) The optical system according to claim 9, wherein said second material is a gas.

11. (Previously Presented) The optical system according to claim 1, wherein said system is arranged to modify a configuration of said third material using electrowetting forces.

12. (Currently Amended) A method of manufacturing an optical

system comprising a diffraction element formed of a substantially rigid first material having a first refractive index, the diffraction element, when manufactured, comprising:

- a) a first plurality of grooves at a first interface of the diffraction element with a second material having a second refractive index; and
- b) a second, differently proportioned, plurality of grooves at a second interface of the diffraction element with a third material having a third, different, refractive index,
wherein the first and second pluralities of grooves are aligned with respect to each other such that a combined diffractive effect is achieved,

the method comprising the acts of:

applying said second material to said first plurality of grooves, and

applying said third material to said second plurality of grooves as a liquid,

~~widths of the first plurality of grooves vary from an edge to a center of the diffraction element a first width of a first groove at an edge of the diffraction element, is different~~

from a second width of a second groove adjacent to the first
groove.

13. (New) The optical system of claim 1, wherein widths of the first plurality of grooves vary from the edge to a center of the diffraction element.

14. (New) The method of claim 12, wherein widths of the first plurality of grooves vary from the edge to a center of the diffraction element.